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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/500,809	07/07/2004	Yulun Li	CU-3830 RJS	6988

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EXAMINER

AWAI, ALEXANDRA F

ART UNIT PAPER NUMBER

3663

DATE MAILED: 01/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/500,809	LI ET AL.	
	Examiner	Art Unit	
	Alexandra Awai	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 November 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 November 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The amendment filed 11/25/2005 appears to overcome the objections to the specification and claims, as well as the claim rejections under 35 USC § 112 of the previous Office Action. However, the amendment has necessitated new grounds of objection and rejection as set forth in sections 2, 3 and 5-9 of this Office Action.

2. The amendment filed 11/25/2005 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material is the amendment to the specification which states “light water is used as coolant” (p. 3) and the amendment to the claims stating that “light water is used as coolant” (claim 1). Although *water* may or may not be *light water*, Applicant has communicated through the Remarks/Arguments that the term *light water* is used to distinguish the two in the present case.

There is only one mention of light water in the original disclosure, and this is made in reference to the Qinshan NPP spent fuel assembly pool reactor. It is not clear from the disclosure whether the Qinshan NPP is the work of the present Applicant or prior art. Given this ambiguity, the Examiner provisionally concludes that the Qinshan NPP is not an embodiment of the present invention, and so its associated parameters, including the type of coolant used, are not relevant to the patentability of the current invention. Applicant is required to cancel the new matter in the reply to this Office Action.

Drawings

3. The drawings were received on 11/25/2005. These drawings, which are apparently the drawings from Chinese priority document PA2, are objected to under 37 CFR 1.84. The drawings possess copy machine marks (37 CFR 1.84(e)) and poor line quality (37 CFR 1.84(l)). Furthermore, the numbers, particularly in Fig. 1, are not plain and legible (37 CFR 1.84(p)) or at least 1/8 inch in height (37 CFR 1.84(p)(3)).

Response to Arguments

4. Applicant's arguments filed 11/25/2005 have been fully considered but they are not considered to be persuasive. All arguments with regard to the 35 U.S.C. § 102 and 103 rejections are directed to the issue that the claims are now further limited by the fact that light water is used as coolant and moderator (Remarks/Arguments pp. 8 and 9). All of the 35 U.S.C. § 102 and 103 rejections of the Office Action dated 8/26/2005 are based primarily upon *Greul*. The English translation of the *Greul* abstract, which has been made of record, clearly states that D₂O (heavy water) serves as moderator while H₂O (light water) and D₂O circulate as coolant within the pressure vessel (2nd paragraph). This *cannot* be interpreted as a teaching that heavy water *must* be used to the exclusion of light water as coolant and moderator, since the light water that circulates within the pressure vessel *necessarily* absorbs neutrons, and so functions as a moderator. Furthermore, as the properties of both light and heavy water are well-known in the art, and are essentially distinguished only by absorption and scattering cross-sections, determining the preferable percentages of either fluid would be an optimization within prior art conditions or through routine experimentation. See *In re Hoeschele*, 406 F2d 1403, 160 USPQ 809 (CCPA

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1969). Therefore, the 35 U.S.C. § 102 and 103 rejections of the Office Action dated 8/26/2005 are herein incorporated in their entirety for ease of reference (see sections 10-15 of this Office Action). Note that claim 4 is now explicitly rejected under 35 U.S.C. § 103.

Claim Objection

5. Claim 1 is objected to because the terms “reactor” and “fuel” in line 3 of the claims should be reversed in order to be consistent with line 1 of the claims. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 1-5 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention, as set forth in section 2 of this Office Action with regard to the issue of new matter.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the

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invention. The claims are unclear as to what is encompassed by the “residual heat removal system” of claim 5. Claim 5 is considered incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements include those components that comprise the residual heat removal system and the manner in which they are configured.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

11. Claims 1 and 3 are rejected under 35 U.S.C. 102(a) as being anticipated by Greul (DE 3718510A). Greul discloses a reactor that operates at low temperature and utilizes spent fuel, such as that from a light water reactor (see English language abstract).

The Greul invention clearly draws upon CANada Deuterium Uranium (CANDU®) technology, which is commonly understood within the relevant art, as the CANDU® reactor was designed in the 1960's. The CANDU® reactor type operates at relatively low temperature and utilizes pressurized coolant as well as unenriched uranium oxide or mixed oxide fuel (i.e. spent fuel). Additionally, Greul states that H₂O and D₂O circulate as coolant within the *pressure vessel* or pressure tubes, thereby necessitating that H₂O and D₂O function as both coolant and moderator. It is conventional in the art for a pressurized-coolant nuclear reactor to comprise a fuel assembly, upper and lower core grid plates, control rods and their drive mechanisms, a

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pressurizer, a core within a core vessel, and coolant inlet and outlet nozzles. These components, with the exception of the pressurizer, were present in some form in the Fermi/Szilárd Neutronic Reactor, patented in 1955 (2,714,577). The use of a secondary reference in connection with a 35 U.S.C. 102 rejection is proper when the secondary reference is cited to show that the primary reference contains an “enabling disclosure”. See MPEP § 2131.01. In this case, the secondary reference gives evidence proving the conventionality, and in most cases, the *necessity* of the listed components in the typical nuclear reactor. It is therefore inherent to the Greul invention, and to various CANDU®-type reactors, that they may be constructed as is broadly set forth by the applicant in claims 1 and 3. As to limitations which are considered to be inherent in a reference, note the case law of *In re Ludtke*, 169 U.S.P.Q. 563; *In re Swinehart*, 169 U.S.P.Q. 226; *In re Fitzgerald*, 205 U.S.P.Q. 594; *In re Best et al*, 195 U.S.P.Q. 430; and *In re Brown*, 173 U.S.P.Q. 685, 688.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

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the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Greul as applied to claims 1 and 3, and further in view of Gou et al. (5,577,085).

Greul does not explicitly teach the use of a sealing cover or airtight shield as a gas shield for a core pool. Gou et al. (Fig. 1) disclose steel domes (articles 6 and 12) over the containment, which comprises a core pool, for the purpose of containing gases within the pressure vessel. It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to implement Gou et al.'s steel dome or domes in order to prevent leakage of radioactive or otherwise harmful gases from the core pool of the reactor type disclosed by Greul.

15. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greul as applied to claims 1 and 3, and further in view of Newton et al. (5,268,942) and Dickson (3,309,278).

Greul does not teach the use of a passive residual heat removal system that is coupled to a spent fuel pool, as is claimed in the present invention. However, Newton et al. disclose a spent fuel pool cooling system comprising a residual heat removal system and a spent fuel pool (Abstract). Note that for cooling to take place, the core pool, which is the source of the heated fluid, *must* be coupled to the body that functions as a heat sink by a passage such as an underwater handling canal. Dickson discloses a solenoid-driven valve (column 4, line 2) that is opened during a loss of power event. It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the fluid connections of the Newton et al.

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invention to operate by an electromagnetic mechanism, as in the Dickson invention, and to incorporate the resulting passive heat removal system into the reactor disclosed by Greul. Furthermore, passive heat removal systems fluidly connected to core pools or spent fuel pools are conventional within the art, and they typically comprise tubes and valves – electromagnetic valves having been used since the 1960's, as shown by Dickson.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexandra Awai whose telephone number is (517) 272-3079. The examiner can normally be reached on 9:30-6:00 Monday-Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AA
December 23, 2005

A handwritten signature in black ink, appearing to read 'Matthew Luu', with a large, stylized initial 'M'.

MATTHEW LUU
PRIMARY EXAMINER